
NAVY PUBLIC WORKS CENTER
NORFOLK, VIRGINIA
UTILITIES DEPARTMENT

STANDARD OPERATING PROCEDURE / JOB HAZARD ANALYSIS

TITLE

REMOVE/REPLACE UNDERGROUND ELECTRICAL HIGH VOLTAGE CABLE

PROCEDURE NUMBER

WC 624 HVE 034

DISTR:
Code 601C.3
Code 610.E1
Code 620
Code 622
Code 622.3

SIGNED:_____

(DATE)

APPROVED:_____

(DATE)

SAFETY PROFESSIONAl:_____

(DATE)

MANAGEMENT OFFICIAL:_____

(DATE)

DATE:_____ **REVISION DATE:**_____

Purpose:
Procedure to remove or to replace cables installed in an underground ductbank.

Potential Energy Sources:
1. Energized 34.5/11.5/4.16 kv cables in manholes
2. Deenergized, but not properly grounded, 34.5/11.5/4.16 kv cables in manholes

Tools And PPE:
Tools: Auger truck, cable trailer, hydraulic cutter with insulated hose, shotgun stick, cable becket, spiking clamp with ground cable, hand cable cutters, manhole hook, cable shoe, steel sling, manhole pump, fiberglass ladder, drop lights, blast blankets, and hand tools. PPE: Nomex coveralls, Nomex hood, insulating rubber gloves, insulating rubber sleeves, hard hat, safety shoes, work gloves, safety glasses, orange vest, safety harness, and back brace if required by back injury prevention and control program. The class of rubber gloves and sleeves will depend on the exposure voltage as per the following: Class 0 - up to 1,000 volts, Class 1 - up to 7,500 volts, Class 2 - up to 17,000 volts, Class 3 - up to 26,500 volts, Class 4 - up to 36,000 volts.

References:
1. PWC Occupational Safety and Health Program Manual, PWCNORVAINST 5100.33E
2. SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck
3. Occupational Safety and Health Standards for General Industry (29 CFR PART 1910): Subpart I, Personnel Protective Equipment; Subpart R, Electrical Power Generation / Transmission / Distribution; Subpart S, Electrical
4. NFPA 70 E approach distances to exposed, energized, electrical conductors and circuit parts.
5. ANSI C2-1987 National Electrical Safety Code
6. Electrical Transmission and Distribution Safety Manual, P-1060
7. SOP WC 622 HVE 013, Deenergization, Lockout, Tagout
8. SOP WC 622 HVE 007, Switchout and Switchback Energized Circuit
9. SOP WC 624 HVE 031, Overhead Voltage & Phase Rotation Checks, Circuits 480 Volts or less
10. SOP 600 HVE 8, Electrical Manhole Entry

Procedures:
1. Operations personnel will deenergize the circuit to be removed, and any other circuits which will interfere with the job. Operations personnel will follow SOPs
   WC 622 HVE 007, Switchout and Switchback Energized Circuit
   WC 622 HVE 013, Hazardous Energy Control(Lockout, Tagout)

2. Open manhole(s) and gas free per SOP 600 HVE 8, Electrical Manhole Entry.

3. The following rules will apply to job.
a) Traffic control devices per SOP 600 HVE 12, Traffic Control Devices,
will be required for work in, or adjacent to roads.
b) A top watch is required when ever personnel are in a manhole.
c) Personnel in a manhole with energized circuits will wear Nomex
coveralls, Nomex hood, insulating rubber gloves, insulating rubber
sleeves, safety shoes, boots, safety glasses and a safety harness
connected to the manhole guard and rescue device.
d) Blast blankets will be placed over all energized circuits in a manhole.
After the blast blankets are in place, personnel in a manhole may
remove their Nomex hoods, insulating gloves, and insulating sleeves.
Work gloves will still be worn.
e) Personnel top side will wear orange vests if the work is in, or adjacent
to, a road. Top side personnel will also wear safety shoes, hard hats,
and work gloves.

4. Identify the circuit to be removed and verify it has been deenergized - Penetrate each conductor of the circuit to be removed with a ground spike attached to a shotgun stick. All personnel should be outside the manhole during the spiking operation, including the spiker.

5. Cut the conductors to be removed - Cut all conductors using a hydraulic cutter, with an insulated hose, that can be operated from outside the manhole. The manhole will be cleared of all personnel when a cut is made. Prior to cutting a cable, mark it if necessary. Mark the conductor with marking tape in two places and cut the cable between the marks. This should be done for all phase wires as well as the ground conductor.

6. Set up Auger truck - Refer to SOP WC 624 HVE 001, Set Up And Secure Bucket/Auger Truck. Use only those steps which are applicable to the cable removal job.

7. Remove cable - Attach winch to conductors to be removed by wrapping conductors with a weight certified steel sling and connecting the sling to the Auger truck’s winch line. Attach a pull string to the other end of the conductors. This pull string will set up pulling the winch line back through the duct after the conductors have been removed. Place Greenlee wheels and rollers where needed. Slowly engage the winch line until the cable begins to move. Take up the line till the cable reaches the truck. If the cable has not come out of the manhole, then the Auger truck will have to be moved forward till the cable

clears the manhole. Detach the pull string and remove the sling and winch line from the cables.

8. Install new cable - Position reel of cable on cable trailer and place the trailer at the manhole determined to be the most suitable for feeding the cable. Set up Auger truck, per Step 6, at the manhole determined to be the most suitable for cable pulling. Large jobs which require several cable pulls will require several Auger truck and cable trailer set ups. Tie and tape the pull string, installed in Step 7, to the winch line. Pull the winch line back through the duct. Slide the open end of the cable becket over the conductors and wire and tape the becket's end to the conductors. Attach becket to winch line with a figure eight connection. Take up slowly on the winch line till the cable starts into the duct. Lubricate the cables liberally as they enter the duct. When the becket is fully in the duct the line speed may be increase if the personnel turning the cable reel can keep up. When the cable reaches the manhole on the pulling end, and sufficient cable to make splices has been pulled out of the hole, stop the winch. Determine how much cable will be needed to splice in manhole at the cable feed end . Cut the conductors from the cable reel. Mark the conductors. Each conductor must be talked out, or toned, to insure that the markings on both ends correspond. This is very important when several pulls are involved. Waterproof the cable ends and place the cable in the manholes, on cable racks. Water proof the conductor ends on the cable reel, and tie them down for transport.

9. Cut up the old cable - Cut the cable in lengths which will fit on a truck. Personnel cutting should wear safety glasses in addition to their other PPE. Hand load the truck and haul the cable away from the work site. Dispose of the cable into a proper dumpster or other approved container or area.

10. Close the manhole(s).

11. Secure Auger truck. Refer to SOP WC 624 HVE 001, Set Up and Secure Bucket/Auger Truck, for details.

12. Operations personnel will energize the circuits which interfered with the job. Operations personnel will follow SOPs
WC 622 HVE 007, Switchout and Switchback Energized Circuit
WC 622 HVE 013, Hazardous Energy Control(Lockout

END